A NEW PERSPECTIVE ON CHINA TRADE GROWTH: APPLICATION OF A NEW INDEX OF BILATERAL TRADE INTENSITY

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Abstract: This paper analyzes China's trade relationships using a new trade intensity index, which incorporates gravity model estimation, to compare observed trade levels with levels would be expected to prevail given the economic, geographic, and cultural characteristics of the trading partners. The index is calculated to study China's bilateral trade intensity, and uses Japan as a comparative case. Standard trade intensity index measures suggest China trades at a very intensive level with countries in East and Southeast Asia (ESA) and at a low level with countries in Europe (EU) and US-Canada (USC). The gravity model based index indicates that China's level of trade with countries in the ESA region is consistent with levels that would be expected given the countries' characteristics, while China's level of trade with EU and USC are greater than one would expect given their characteristics. The new index also reveals insights regarding the evolution of China's trade partners during the years 1988-2005. The paper's results suggest the gravity model adjusted trade intensity index can provide a useful analytical tool for identifying strategic or other deviations in trade levels.

Key Words: Gravity model, Trade Intensity Index, Bilateral Trade, China

JEL codes: F14, F13, C43

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1. Introduction

Since China reopened its door to the world in the late 1970s, its international trade policies have rapidly progressed from the prohibition of trade in all but a few products with a few countries, to a relatively liberal stance towards both imports and exports in the world market. Since reopening, China's exports and imports have increased at a high rate (annual growth rates of exports and imports averaged 10.8 percent and 11.2 percent, respectively, between 1978 and 2009).[1] Within this overall growth trend, the level of growth in China's trade with particular countries varied markedly. Before liberalization, China's foreign trade was oriented primarily toward other Eastern Bloc countries, displaying a trading pattern typical of Eastern Bloc countries. During the 1980s and 1990s, China's trade refocused dramatically towards large market economies (Europe and North America), Asian economies, and countries with large endowments of natural resources. From 1980 to 2005, China's trading partners increased from 87 to 182 out of 200 countries and regions reported by the International Monetary Fund (*Direction of Trade Statistics*, 2008). China's exports to both Europe and North America expanded by more than 300 percent over the period of 1995-2005, while its imports from natural resource abundant countries grew even more rapidly (Edmonds et al., 2006).

In this paper, we use a new trade intensity index--which we will refer to as the Gravity Model Adjusted Trade Intensity (GMATI) index--to compare China's bilateral trade with particular countries to levels that would be expected to prevail given the structural characteristics of China's and the trading partnership's economy. The standard and new trade intensity index values are also calculated for Japan to provide a comparative case. Calculation of the GMATI index indicates that the strength of trade relationships between China and countries in selected

[1] Values are calculated from data (in constant 2000 US$) in *World Development Indicators*, World Bank (2007).

regions are generally explained by the cultural, economic, and geographic characteristics of the trading economies. The new index also indicates the possibility of intervention or strategic trade between China and some other regions (e.g., African countries), which can counteract or magnify the effects of the cultural, economic, and geographic characteristics on trade. The paper also reviews the definition of the trade intensity index and its previous applications in the literature, and describes the estimation model and data sources used to compute GMATI values for China. The paper's final section presents results and the main conclusions that can be drawn from the index estimates.

2. The Trade Intensity Index and measures of bilateral trade relationships

There is a large body of literature on the measurement and analysis of bilateral trade. In a survey of the literature, Drysdale and Garnaut (1982) identified two basic approaches for systematic studies of bilateral trade: the gravity model of bilateral trade introduced by Linder (1961), Tinbergen (1962) and Linnemann (1966); and the trade intensity approach developed by Brown (1949) and Kojima (1964). The gravity model approach assesses the intensity of between two economies in proportion to their economic sizes (measured by GDP, population, per capita GDP, area, etc.) and inversely proportional related to the distance (both geographical and cultural distance) between them.

Computation of trade intensity indices provide a convenient approach for describing the geographic distribution of country trade and for analyzing the strength of bilateral trade ties between countries. A number of indicators have been used in empirical examinations of international trade to measure the tendency for particular countries to trade. These indices gauge the level of trade against the size of economies, and other structural characteristics considered

(e.g., distance between the countries) important in determining trade levels. The simplest index, the trade share deflates the value of exports (or import or trade volume) and the trade share: $S_{ij} = x_{ij}^T / x_{iW}^T$, where S_{ij} is the share of exports from country *i* to country *j* to country *i*'s total exports to the world; x_{ij}^T is exports from country *i* to country *j*, and x_{iW}^T is the total exports of country *i* to the world. The trade share is useful in comparing trade flows between two countries over time. However, its usefulness in cross-country comparisons is limited since the measure does not account for the effect of economy size on trade level and different sized economies can be expected to trade in proportion to the size of their economies. The trade intensity index addresses this shortcoming by measuring trade levels between country *i* and *j* in relation to country *j*'s average trade share across all countries of the world.

The Trade Intensity Index proposed by Brown (1949) and Kunimoto (1977) takes each country's total imports and exports as given, and divides the determinants of international trade into two categories: factors that influence the levels of total imports and exports of the countries in the world, and factors that influence their geographical distribution. The indicator assesses actual trade against the flow of trade that would prevail in a hypothetical world of countries with no "geographic specialization" in foreign trade. Under this hypothetical scenario, each country's total trade would be distributed across countries according to each trade partner's share of world trade. Symbolically, the hypothetical trade flows from country *i* to country *j* ($\bar{x}_{ij}$) would be:

$$\bar{x}_{ij} = (x_{iW} \cdot x_{Wj}) / (x_{WW} - x_{Wi}) \qquad (1.1)$$

where $\bar{x}_{ij}$ is country *i*'s exports to country *j* in the hypothetical world, x_{iW} is country *i*'s total exports, x_{Wj} is country *j*'s total imports, x_{WW} is the total world imports, and x_{Wi} is country *i*'s total exports to the world. Actual trade flows from country *i* to country *j* differ from the hypothetical

value derived by equation (1.1) because of the presence of the factors that influence trade flows between countries. Expressing actual and hypothetical trade flows as a ratio, we obtain the geographic trade intensity index (I_{ij}):

$$I_{ij} = \frac{x_{ij}}{\bar{x}_{ij}} = \frac{x_{ij}}{x_{iW}} \Big/ \frac{x_{Wj}}{(x_{ww} - x_{Wi})} \tag{1.2}$$

where x_{ij} is country *i*'s actual exports to country *j*. If the trade intensity index equals 1, trade partners are trading without geographic bias. Values of the index above (below) 1 indicates the trade between two countries is more (less) intensive than expected.

Ng and Yeats (2003) introduced a distance adjustment to the trade intensity index in an analysis of East Asia trade. Their index accounts for geographic distance while measuring each country's trade intensities to different trading partners. This approach first estimates the following equation:

$$\ln(I_{ij}) = \alpha + \beta \ln(distance) \tag{1.3}$$

where I_{ij} represents the intensity of country *i*'s export to country *j*, given *distance* between the capitals of the two trading countries. The coefficient $\hat{\beta}$ is estimated based on cross-sectional time series data so captures the average effect of distance on trade intensities between pairs of countries worldwide, and is used to predict $\hat{I}_{ij}$ -- the expected trade intensity assuming no geographic specialization factors other than distance exist. The distance adjusted trade intensity index is defined as $I_{ij} / \hat{I}_{ij}$. It measures the trade intensity caused by geographic specialization factors other than distance. Again, a value greater (less) than 1 suggests the trade intensity is above (below) expected after considering the effect of distance between them. Ng and Yeats'

estimation coefficients on distance is negative and statistically significant as expected, and has an R square is of 0.672.

Building upon the Ng and Yeats approach, our GMATI Index combines the gravity model and the trade intensity index approach to analyze and describe a countries' bilateral trade. Computation of the index proceeds by estimating each country's expected exports and imports ($\hat{x}_{ij}$) using a standard gravity model. Therefore, the variable we estimated is the trade value instead of the intensity index. The estimated exports and imports are then used to calculate the expected trade intensity between two countries, given that all countries trade as predicted by the gravity model:

$$\hat{T}_{ij} = \frac{\hat{x}_{ij}}{\hat{x}_{iW}} \Big/ \frac{\hat{x}_{Wj}}{\hat{x}_{ww}} \qquad (1.4)$$

where $\hat{x}_{iW} = \sum_j \hat{x}_{ij}$, $\hat{x}_{Wj} = \sum_i \hat{x}_{ij}$ and $\hat{x}_{ww} = \sum_i \sum_j \hat{x}_{ij}$.

The GMATI index is defined as $T_{ij} / \hat{T}_{ij}$ (1.5)

where T_{ij} uses the actual rather than estimates values of x_{ij}, x_{iW}, x_{Wj}, and x_{ww} as in (1.4). This index gauges the bilateral trade intensities based on countries' characteristics as included in the gravity model. If a country's geographic specialization of foreign trade follows the prediction of gravity model, its actual trade intensity should equal its expected trade intensity, i.e. GMATII=$T_{ij} / \hat{T}_{ij}$ =1. If the value of GMATI index is greater (smaller) than 1, it indicates that the trade intensity between the two countries is greater (smaller) than the expected level based on the gravity model estimations, (i.e. the strength of trade relationship between the two economies cannot be completely explained by their economic, geographic and cultural characteristics described in the gravity model). The GMATI index is used to investigate whether China has traded more

intensively with some regions and countries in its trade expansion or whether the strength of the trading relationship reflects global averages given the economic, geographic and cultural characteristics of China and its trading partners.

3. Estimation Model

Our GMATI index adjusts for several factors found to empirically affect trade between countries. Our specification of the gravity equation follows the specification in Clarete et al. (2003), and is as follows:

$$\begin{aligned}\ln(I_{i,jt}) = [&\beta_0 + \beta_1 \ln D_{i,j} + \beta_2 \ln(Y_i)_{t-1} + \beta_3 \ln(Y_j)_{t-1} + \beta_4 \ln(Y_i / Pop_i)_t \\ &+ \beta_5 \ln(Y_j / Pop_j)_t + \beta_6 \ln(Area_i) + \beta_7 \ln(Area_j) + \beta_8 \ln Smctry_{i,j}] \\ &+ [\beta_9 Landl_i + \beta_{10} Landl_j + \beta_{11} Cont_{i,j} + \beta_{12} Island_i + \beta_{13} Island_j] \\ &+ [\beta_{14} Lang_{i,j} + \beta_{15} Colony_{i,j} + \beta_{16} ComCol_{i,j} + \beta_{17} Col45_{i,j}] + \varepsilon_{i,jt} \quad (1.6)\end{aligned}$$

where *i* and *j* denotes trading partners (country *i* is the exporting country and *j* is the importing country), and *t* denotes time. The variables on the left hand side are divided into three groups denoted by the square brackets. The first group of variables (β_1 to β_8) captures notions of economy size and country size which are considered fundamental in driving trade flows under the gravity model. All the models estimates include these variables and together they are referred to as the base gravity model. A second group of variables (β_9 to β_{13}) captures geographic characteristics (aside from distance between countries) that are expected to influence trade. A third group of variables (β_{14} to β_{17}) captures shared historical and linguistic ties between countries.

Notation of the variables in the model, and the expectation regarding the relationship between the level of trade and each variable, are as follows:[2]

$I_{i,jt}$ denotes the value exports (or imports) in constant (year 2000) $US of country *i* to country *j* at time *t*.

$D_{i,j}$ is the linear distance between capital cities of the trading countries. Distance is expected to have a negative association with trade level since it proxies transport and transaction costs.

Y is real GDP of country *i* or *j* in year *t-1* (in constant year 2000 $US dollars). The variable enters the model with a one year lag to address potential endogeneity between trade levels and GDP. Larger economies are expected to trade more.

Pop is the population of country *i* or *j* in year *t*. Countries with larger populations are generally expected to trade less because of their larger domestic markets.

Area is the land area (in square kilometers) of country *i* or *j*. Countries with large land areas are expected to trade less because greater land area is associated with larger internal markets and greater availability of resources domestically.

Smctry is a binary variable which is unity if both country *i* and *j* had constant boundaries between 1988 and 2005.[3] Countries with steady borders are expected to have higher trade due to their greater stability and cultivation of trading relationships over time.

[2] The rationale for the inclusion of particular variables and expectations regarding their relationship to trade levels is widely discussed in the literature developing and applying the gravity model of trade, for example see discussions in Linneman (1966), Krugman (1991), and Frankel (1997).

[3] With the break up of the Former Soviet Union, Yugoslavia, and a few other countries, several new countries were formed after 1985, and interrupts time series data)

Landl is a binary variable which is unity if country *i* or *j* is landlocked (no sea ports of direct sea access). Landlocked status is expected to be associated with lower trade due to higher trade costs.

Cont is a binary variable which is unity if country *i* and *j* border one another. Countries sharing a common land border are expected to trade more due to proximity and ease of overland transport.

Island is a binary variable which is unity if country *i* or *j* is a small island country. Small island countries are expected to trade at a higher rate due to limited domestic market and natural resources.

Lang is a binary variable which equals 1 if *i* and *j* share a common language (zero otherwise). Shared language and historical ties through colonialism are expected to increase trade links between countries.

Colony is a binary variable which equals 1 if country *i* established a colony in country *j* or vice versa.

Comcol is a binary variable which is unity if *i* and *j* were colonies of the same colonial power.

Col_{45} is a binary variable which is unity if *i* and *j* had a colonial relationship after 1945.

$\varepsilon_{i,jt}$ represents the estimation residual (model error) and reflects the effect of other influences on bilateral trade that are not included in the model.

The coefficients in equation (1.6) can be interpreted as measuring the elasticity of exports with respect to changes in the explanatory variables. Following established practice, continuous variables in the model expressed in logarithmic form in keeping with standard practice. Because of potential endogeneity between trade levels and GDP, we estimate the model using real GDP

with a 1 year lag. As suggested by Anderson and Wincoop (2003), country specific dummies are introduced into the regression to address the multilateral resistance problem.[4]

To examine whether China's trading partners demonstrate a bias toward trade with particular regions, such as East and Southeast Asian countries, African countries, or Middle East countries, we introduce binary dummy variables to the gravity model. For example, a dummy variable $China_{ex}^{ESA}$ takes a value of 1 if the exporter is China and the importer is an East or Southeast Asian country and is assigned a value of zero otherwise. Altogether, 16 additional dummies are considered in the panel estimates: $China_{ex}^{AFR}$, $China_{im}^{AFR}$, $China_{ex}^{ESA}$, $China_{im}^{ESA}$, $China_{ex}^{EU}$, $China_{im}^{EU}$, $Chinaex^{LAC}$, $China_{im}^{LAC}$, $China_{ex}^{ME}$, $China_{im}^{ME}$, $China_{ex}^{OCN}$, $China_{im}^{OCN}$, $China_{ex}^{USC}$, $China_{im}^{USC}$, $China_{ex}^{FSR}$, and $China_{im}^{FSR}$, where the abbreviations are: Africa (AFR), East and Southeast Asia (ESA), Europe (EU), Latin America and the Caribbean (LAC), Middle East (ME), Oceania (OCN), United States and Canada (USC), and Former Soviet Republics (FSR).[5]

4. Data Sources and Estimation Models

Data on exports used in the estimates are drawn from World Trade Analyzer 2008 (WTA)—a trade database provided by the International Trade Division of Statistics Canada—which rectifies trade data of the United Nations Conference on Trade and Development

[4] "Multilateral resistance" raises a complication in simple pairwise estimation of the gravity model. The more resistance there is to trade with one economy, the more trade is pushed toward other trade partners. Both theoretical [Anderson (1979)] and empirical [Anderson and Wincoop (2003), Subramanian and Wei (2007)] models have explored shown the effects of multilateral resistances on bilateral trade flows and shown that failure to account for such resistance results in misspecification of the standard gravity model. Several papers have developed methods to address multilateral resistance. Baldwin and Taglioni (2006) argue that country-pair dummies are superior to country dummy variables in panel regressions due to the existence of time-series bias. However, this approach cannot be applied in this instance because inclusion of the country-pair dummies precludes inclusion of time-invariant variables, such as distance, which are integral to the gravity model. Instead, country dummies are used in our regressions. In particular, each country has two specific dummies (e.g., $China_{ex}$ and $China_{im}$ for China). The value of $China_{ex}$ ($China_{im}$) equals 1 if the exporter (importer) is China, and otherwise equals 0.

[5] Lists of countries for each region are included in the Appendix.

(UNCTAD) so that exports reported by the exporting country are consistent with the imports reported by the importing country. The original UNCTAD data does not ensure concordance between exports to country B reported by country A and imports from country A reported by country B. Use of the WTA data, where concordance is assured, means regressions run on exports or imports produce equivalent results. We estimate our models for exports following standard practice.

Data on distance between trading countries and related geographic characteristics are obtained from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) database.[6] The database captures a number of geographic characteristics for 225 countries, including the distance between the capital and largest cities of each pair of countries, and dummy variables indicating whether a country is landlocked; and whether pairs of countries share a land border, common language, or post-WWII colonial history. The final database yields a panel of 32,942 country pairs (involving 182 countries) during the period 1988 to 2005. The World Bank's World Development Indicators (WDI 2008) was the source of real GDP used in the model.[7]

The gravity model is estimated using the standard generalized log-linear least squares regression on cross-section data of selected individual years, as well as random effect GLS regression on panel data.[8] The panel estimator is expected to be more efficient since it makes use of the fact that the level of trade between each country-pair is observed over time so the estimation makes use of both the cross sectional and time series variation in trade in explaining

[6] Available online at http://www.cepii.fr/anglaisgraph/bdd/distances.htm (last accessed on September 3, 2010)
[7] Data of development indicators for Taiwan are obtained from ADB (2005).
[8] We also tried Random Effect Tobit regression on panel data since the trade values are left censored at zero. However, the quadrature check provided by Stata 9.2 indicates that all our Tobit estimations are unreliable. Therefore, we can only use the GLS regression to estimate the model for country-pairs with positive trade, omitting country-pairs with zero trade. Accordingly, our model only explains the trade levels across countries rather than trade per se (i.e., the decision of whether to trade and the level of trade).

trade levels. On the other hand, the cross-sectional estimation results have the advantage of being somewhat easier interpret, and by considering how cross-sectional estimates evolve over time, one can gain useful insights into how the factors driving trade flows have changed over time.

5. Estimation Results and Trade Intensity Index Calculations

Next, we consider the results of our estimates. First, we review results form the single-year gravity model estimates as an entrée to our empirical examination of the strength of China's trade relations (and compared to Japan as an early East Asian export-led high growth economy). Moving on to the panel estimators, we review the random effects GLS gravity model estimates. The section concludes by calculating the standard trade intensity and the GMATI indices and comparing their values. Our ultimate purpose in estimating the gravity models is to obtain estimation coefficients that can be applied in the GMATI index, but the legitimacy of the index itself rests on the robustness and accuracy of the gravity model estimates.

Table 1 summarizes estimates from the OLS regressions for single years of cross-sectional data between 1988 and 2005. Overall, the model estimates perform well, explaining about 75% of the variation in trade between country pairs and most of the variables expected to influence trade under the gravity model are significant (at 95% level) and have expected signs. Estimates find exports increase with trading partners' GDP and decrease as the distance between trading economies increases. The GDP per capita and area variables are statistically significant with negative signs in most years, as expected. Landlocked countries trade more than those with access to sea, while island economies tend to trade less according to the models. Countries sharing a common language or colonial history are found to trade more with each other, ceteris

paribus. Country pairs that share a land border or that had consistent boundaries throughout the years covered in the dataset, also traded at higher volumes than others.

Table 2 summarizes the estimation results from the random effects GLS regressions. As mentioned previously, country-pairs that did not engage in any trade are dropped from the sample used in these estimates, so the estimator explains the level of trade between trading economies. The dependent variable for specifications (1) to (3) is the value of exports between each country pair. The dependent variable for regression (4) is the calculated export intensity index (equation 1.3). R-squares ranged between 0.37 to 0.73 across the specifications, and the estimation coefficients are statistically significant and similar across all 4 specifications (except in specification (4) where the estimation coefficient on GDP per capita, land area, and dummies capturing geographic characteristics were significant but had signs that are inconsistent with theoretical expectations). Overall, results suggest the gravity model performs very well in explaining the bilateral levels of trade, but less successfully in explaining values of the trade intensity index. In the next section of this part of the paper, we use the estimation coefficients from specification (3) in Table 2 in our computation of the GMATI index. We conclude by examining the performance of these trade indicators in terms of its explanatory power and consistency with predictions under the standard gravity model.

The estimates in Table 3 add regional trade dummy variables to investigate whether data suggest there is evidence of regional bias in China's trade partners. Estimation coefficients for all the regional import dummies are all greater than 1 and significant at 5% level. The estimated coefficient for $China_{im}^{USC}$ is the largest among the regional import dummies, indicating that once the effects of other factors influencing trade levels captured in the gravity model are considered, China's imports from United States and Canada actually occur at a higher level than from other

regions considered in the estimator. This was somewhat of a surprise given longstanding complaints from some NA countries about the balance of trade with China.

In terms of exports, only the estimated coefficients for $China_{ex}^{AFR}$ and $China_{ex}^{ME}$ are positive and statistically significant at the 5% level. Both these coefficients have values greater than 1, while export dummies for other regions were generally positive (except for FSR which was negative), but not statistically significant. Along with the positive and significant coefficients for imports from these regions, these results suggest that China's overall trade level with these two regions is higher than average after accounting for other gravity model factors. In contrast, the results do not suggest that China exported excessively to countries in the EU or USC regions, despite persistent trade surpluses, once the structural characteristics (captured in the gravity model) of these country-pairs that are considered. It is also worth noting that estimated coefficients of import dummies are greater than that of the corresponding export dummies of each region. This may be attributable to China's high levels of importation of intermediate inputs for their manufacturing industries. Dean and Lovely (2009) estimate that more than half of China's exports are processing exports and about one third of China's imports are imports related to intermediate inputs related to export processing industries. Therefore, China imports more actively than most other countries.

A few general conclusions can be drawn from the gravity model estimates reviewed above. China's trade does not demonstrate a bias toward trade with countries in the ESA region. China's exports to Africa and Middle East have been at higher levels than would be expected given their characteristics as captured in the gravity model. China's economy has demonstrated a bias toward foreign trade. Its exports and imports are both at levels above what would be expected given its characteristics, but import bias appears stronger.

We conclude our analysis by computing the standard trade intensity index and the GMATI index for available country pairs over the period of 1988-2005. Results are too numerous for them all to be reported, so we present results for index values of China's trade intensity with selected 25 countries in 8 regions in Table 4. Calculation of the GMATII for individual country-pairs exactly follows equation (1.5). For calculating GMATII between China and a region, such as the ESA region, we merely aggregate trade flows across all countries in the region. Intra-regional exports (imports) are included in calculations of the regional exports to (imports from) China since both intra- and inter-regional exports (imports) reflect the region's demand (supply) in the world market. This makes the regional values of the trade indices comparable to values calculated for country-pairs (as presented in Table 4). However, treating intra-regional trade as inter-regional trade raises standard "border puzzle" problems. [9] Nonetheless, we include intra-regional trade since excluding it in the calculation of the trade intensity indices leads to overvaluation of the indices' value. This is because trade with other regions represents a relatively larger portion of total trade represented by trade with countries in other regions if intra-regional trade is excluded.

Table 4 and the Appendix Table show that in 2005, the strade intensity index had values of greater than one for: China's exports to AFR, ESA, OCN, and USC, and for China's imports from AFR ESA and OCN. This same year, the standard intensity index is greater than 1 for Japan's exports to ESA, OCN, and USC, and imports from ESA, ME, OCN, and USC. These results imply that China's and Japan's trade with these regions is above the world average level. The corresponding values of the GMATI index reveal a different picture regarding which regions were trading intensively with China and Japan. The GMATI index suggests that China exports

[9] See Anderson and Wincoop, 2003.

and imports occurred at a level that was higher than would be expected with countries in the EU and USC regions, and (only in 2005) imports intensively with AFR countries. For the case of Japan, the GMATI index indicates that Japan exports most intensively with the EU and USC regions, and imports most intensively with AFR, EU, ME, OCN, and USC.

Values of the standard trade intensity and GMATI indices vary markedly for given regions, and distance appears to be the dominant factor in driving these differences. In countries closer to China or Japan, the GMATI index generally suggests levels of trade are less intense than the trade intensity index, and vice versa, which is consistent with the strong influence distance (and associated trade costs) have on trade flows. The largest discrepancies observed in the case of China's exports are found in the cases of exports to the ESA and EU regions. The standard trade intensity index suggests China exports very intensively to countries in the ESA region, while the GMATI index suggests China's level of exports to ESA countries are actually well below levels that would be expected given global averages and the characteristics of these economies. This is consistent with our conclusion drawn from Table 3. A possible explanation for this is that China and the ESA economies produce similar goods for export (i.e., using technologies and resource endowments at are similar), so these shared characteristics make their exports competitive, counteracting the proximity advantage in trade between these countries.

Considering the case of EU-China trade, we find the opposite pattern between the two indices, with the standard index suggesting China's exports to the EU region occur at low intensity while the GMATI shows exports occurred at a very intensive level. The differences between the two indices reflect the role of proximity and other characteristics captured in the GMATI index in generating the expected level of trade. When the value of the GMATI index is greater than the standard index (as in the case of China-to-EU exports), it implies that the actual

level of trade is much greater than one would expect given the distance (both physical and cultural) between China and the countries in the EU region. This may be a result of differences in the technology or resource endowments of these countries which foster greater trade or may reflect governments' trade promotion efforts. Other notable cases where the standard and GMATI indices yielded very disparate results were: (i) OCN and USC (China exports) and (ii) ESA, EU, OCN, and USC (China imports).

Examining how values of the standard and GMATI indices change over time reveals the changing trade relations between countries and the impact of trade policies on trade levels in light of the fundamental characteristics of trading economies.. For example, Table 4 shows the dramatic increase in the intensity of China's exports to the USC and EU regions over the studied period, and the contrasting (relatively stable) intensities for China's imports from countries in these regions. China's trade policies generally focused on export promotion during the period studied and the change in the index values seem to reflect this focus. On the other hand, China's exports to ESA region decrease between 1990 and 2005, falling from 0.33 to 0.25 during those years. However, examination of this trend at the country-pair level shows only China's exports to Mongolia had a clear decreasing trend. Its export intensity for most ESA economies such as Japan, South Korea, and India increased during the same period as listed in Table 4.

A possible explanation for these trends is that China's exports to countries in the ESA region became shifted across countries within the region over time, with the shift in export shares changing the most in countries that started out with the lowest levels of trade with China. So in spite of the growth of Chinese exports, the portion of China's total exports to ESA fell as captured in a declining GMATI index value. For example, the value of the GMATI index for China's exports to South Korea is lower than the value of the index for the ESA regional; while

the index values for China's exports to Japan are greater than the regional index in most years. From 1990 to 2008, the average annual growth rate of China's exports to South Korea was 29.7%, while the corresponding growth rate for China's exports to Japan was 17.3%, and in 1990, more than 17% of China's exports went to Japan while only 1.3% went to South Korea. As compared to 2005, when the share of China's exports to Japan decreased to 11.7% and the share of China's exports to South Korea increased to more than 4.4%. Accordingly, while undergoing a rapid rise in exports to these two ESA countries, China lowered its regional export intensity to ESA due to shifts in the country destinations of its exports within the region.

The GMATI index values for China's imports from the ESA region as a whole increased steadily over the years studied, rising from 0.31 in 1990 to 0.45 in 2005. The GMATI Index for individual ESA countries also shows increasing intensity of China's imports from most ESA countries (e.g., India, Japan, South Korea and Vietnam), as shown in Table 4. Overall, our GMATI Index implies that the importance of exports to the ESA regional market for China's economy has declined over time, while the importance of imports from ESA, has increased.

These same calculations suggest China has traded more intensively with Africa over the period considered (shown on the Appendix Table). The GMATI index for both China's exports and imports with Africa increased. Furthermore, the GMATI index for China's imports from Africa grew from less from 0.24 in 1990 to 1.24 in 2005, which is the fastest intensity growth of China's import among the 8 regions we studied. This may reflect diplomatic overtures China has made toward Africa over the past decade and mirrors trends in China's direct investment in the region, which has generally targeted resource-extraction industries (Chan-Fishel, 2007). However, when we look at GMATI Index values for individual African countries with China, we see that values for imports from most of the Africa countries are less than one (with some below

0.5), especially for bigger African economies such as South Africa and Egypt. Therefore, China's impacts on Africa through trade are not as strong as suggested by standard trade intensity measures.

6. Conclusions

In this paper, we investigate the strength of China's trade ties with particular countries and regions. To examine if a country is trading with a particular country or region at a higher or lower rate than would be expected given the characteristics of the economies, we introduce the GMATI index and apply it to measure China's trade ties and their evolution over time. After controlling for the effects of both geographic and cultural distance as well as economy size, the GMATI index indicates that China trade with the ESA region and individual countries in the region was less intensive, and was more intensive with EU and USC, than suggested by standard intensity measures. The discrepancy between trade intensity measures may also reflect differences in the underlying comparative advantage of trading economies or suggest effects of government trade intervention (i.e., strategic trade policies). By examining the change of GMATI index over time, we also find indications on that in terms of its exports to the ESA region, China exports to individual ESA countries have shifted significantly over time. Trends also suggest China's exports to EU and USC countries have grown more intensive over time. Lastly, GMATI index values show that China has traded (both exported and imported) with African countries more intensively over time.

Although comparison of the GMATI index values with standard trade intensity measures provides insight into the effects of economy sizes and distances between markets (both geographical and cultural distance), more analysis is needed to explore the factors affecting these

trading patterns. Differences in the resource endowments, real exchange rates, macroeconomic balances, and similar characteristics that drive underlying comparative advantage between trading economies likely drive these differences, but more detailed analyses are beyond the scope to the current paper and are left for future research.

Table 1. OLS Regression Results for Cross Section Data in Selected Years

Estimated Coefficient — Dependent variable: Exports
(Standard Error of Estimated oefficient)

Year	1988		1992		1996		1998		2000		2002		2004		2005	
$Ln(D_{ij})$	-1.242	***	-1.295	***	-1.370	***	-1.388	***	-1.451	***	-1.464	***	-1.447	***	-1.455	***
	(0.031)		(0.029)		(0.025)		(0.024)		(0.023)		(0.024)		(0.023)		(0.024)	
$Ln(Y_i)_{(t-1)}$	0.717	***	0.427	**	0.418	***	0.523	***	1.022	***	0.728	***	1.045	***	1.399	***
	(0.166)		(0.184)		(0.148)		(0.129)		(0.093)		(0.104)		(0.056)		(0.082)	
$Ln(Y_j)_{(t-1)}$	0.409	***	0.605	***	0.545	***	0.608	***	0.621	***	0.298	***	0.612	***	0.706	***
	(0.102)		(0.100)		(0.097)		(0.087)		(0.066)		(0.092)		(0.065)		(0.083)	
$Ln(Y/pop)_i$	-0.273		0.942	***	0.362		0.123		-0.200		0.295		0.379	***	-0.500	***
	(0.188)		(0.290)		(0.244)		(0.191)		(0.176)		(0.185)		(0.067)		(0.105)	
$Ln(Y/pop)_j$	0.377	***	0.447	***	0.624	***	0.274	**	-0.205	**	0.062		-0.310	***	0.080	
	(0.103)		(0.167)		(0.187)		(0.128)		(0.081)		(0.106)		(0.077)		(0.125)	
$Ln(Area_i)$	-0.269	**	0.158		0.148	**	0.396	***	0.053		0.231	***	-0.025		0.010	
	(0.112)		(0.165)		(0.070)		(0.087)		(0.060)		(0.065)		(0.037)		(0.035)	
$Ln(Area_j)$	0.034		0.026		-0.128	**	0.024		-0.035		-0.052		0.058		0.056	
	(0.073)		(0.059)		(0.053)		(0.059)		(0.055)		(0.055)		(0.052)		(0.054)	
$Smctry_{ij}$	0.796	***	0.702	***	0.602	***	0.594	***	0.779	***	0.696	***	0.819	***	0.704	***
	(0.278)		(0.227)		(0.179)		(0.164)		(0.151)		(0.160)		(0.147)		(0.157)	
$Landl_i$	0.738	*	0.892	**	0.848	**	1.000	***	1.124	***	0.924	***	0.826	***	1.026	***
	(0.397)		(0.353)		(0.334)		(0.317)		(0.298)		(0.309)		(0.295)		(0.289)	
$Landl_j$	0.365		-0.172		0.026		-0.432		-0.311		-0.135		-0.320		-0.519	*
	(0.466)		(0.366)		(0.350)		(0.284)		(0.293)		(0.279)		(0.294)		(0.289)	
$Island_i$	0.549		3.172	***	0.867		3.693	***	1.286	***	2.011	***	-0.477		2.131	***
	(0.570)		(0.443)		(0.591)		(0.661)		(0.418)		(0.466)		(0.341)		(0.496)	
$Island_j$	0.125		0.382		0.153		0.854	**	0.818	***	0.560		1.091	***	1.251	***
	(0.388)		(0.355)		(0.407)		(0.351)		(0.310)		(0.350)		(0.315)		(0.315)	
$Cont_{ij}$	-0.033		0.370	***	0.570	***	0.581	***	0.719	***	0.587	***	0.657	***	0.609	***
	(0.153)		(0.141)		(0.117)		(0.114)		(0.104)		(0.109)		(0.105)		(0.111)	
$Lang_{ij}$	0.462	***	0.515	***	0.583	***	0.570	***	0.548	***	0.559	***	0.650	***	0.632	***
	(0.064)		(0.059)		(0.054)		(0.053)		(0.052)		(0.052)		(0.051)		(0.053)	
$Colony_{ij}$	1.193	***	1.111	***	1.261	***	1.192	***	1.161	***	1.035	***	0.974	***	0.967	***
	(0.103)		(0.112)		(0.105)		(0.096)		(0.098)		(0.099)		(0.099)		(0.099)	
$ComCol_{ij}$	0.521	***	0.309	***	0.832	***	0.889	***	0.856	***	0.630	***	0.733	***	0.821	***
	(0.100)		(0.089)		(0.078)		(0.074)		(0.069)		(0.069)		(0.068)		(0.070)	
Intercept	-9.395	**	-20.226	***	-12.982	***	-17.390	***	-17.414	***	-12.239	***	-22.124	***	-28.994	***
	(3.653)		(2.564)		(2.597)		(1.797)		(1.604)		(1.770)		(1.803)		(2.177)	
N	8457		9949		13867		14952		15711		15642		16272		16013	
R^2	0.75		0.76		0.75		0.74		0.75		0.75		0.76		0.76	

Note: a. * , ** and *** denote significant at the 90%, 95% and 99% level.

b. n is the number of Observations

c. Coefficients for country dummies and intercept are not reported.

Source: Statistics Canada *Trade Analyzer* (2008).

Table 2. Random Effects GLS Model for Panel Data

Estimated Coefficient
(Standard Error)

Regression	(1)	(2)	(3)	(4)
Dependent variable:	ln(Exports)	ln(Exports)	ln(Exports)	ln(Trade intensity index)
$Ln(D_{ij})$	-1.46 ***	-1.39 ***	-1.32 ***	-1.34 ***
	(0.016)	(0.017)	(0.017)	(0.017)
$Ln(Y_{i,t-1})$	1.19 ***	1.19 ***	1.19 ***	0.25 ***
	(0.029)	(0.029)	(0.029)	(0.029)
$Ln(Y_{j,t-1})$	0.73 ***	0.73 ***	0.73 ***	0.16 ***
	(0.029)	(0.029)	(0.029)	(0.028)
$Ln(Y_{it}/pop_{it})$	0.56 ***	0.56 ***	0.56 ***	-0.38 ***
	(0.035)	(0.035)	(0.035)	(0.034)
$Ln(Y_{jt}/pop_{jt})$	0.57 ***	0.57 ***	0.57 ***	-0.28 ***
	(0.034)	(0.034)	(0.034)	(0.033)
$Ln(Area_i)$	-3.20 ***	0.31 ***	0.30 ***	-0.04 *
	(1.005)	(0.023)	(0.023)	(0.023)
$Ln(Area_j)$	-0.09 ***	-0.03	-0.03	-0.02
	(0.027)	(0.030)	(0.029)	(0.030)
$Smctry_{ij}$	1.47 ***	1.09 ***	0.70 ***	0.73 ***
	(0.105)	(0.108)	(0.107)	(0.108)
$Landl_i$		0.59 ***	0.62 ***	0.58 ***
		(0.180)	(0.177)	(0.178)
$Landl_j$		-0.21	-0.22	-0.24
		(0.178)	(0.175)	(0.175)
$Island_i$		0.40 *	0.68 ***	-0.63 ***
		(0.219)	(0.216)	(0.216)
$Island_j$		0.72 ***	0.63 *	0.64 ***
		(0.178)	(0.174)	(0.175)
$Cont_{ij}$		1.00 ***	0.86 ***	0.82 ***
		(0.077)	(0.076)	(0.077)
$Lang_{ij}$			0.53 ***	0.55 ***
			(0.037)	(0.037)
$Colony_{ij}$			0.44 ***	0.42 ***
			(0.133)	(0.134)
$ComCol_{ij}$			0.69 ***	0.67 ***
			(0.044)	(0.045)
$Col45_{ij}$			1.30 ***	1.27 ***
			(0.171)	(0.172)

Notes: See bottom of table on the next page.

Table 2. (continued)

Estimated Coefficient
(Standard Error)

Regression	(1)	(2)	(3)	(4)
Dependent variable:	ln(Exports)	ln(Exports)	ln(Exports)	ln(Trade intensity index)
degrees of freedom $_{(m)}$	8	13	17	17
σ_u	1.43	1.43	1.40	1.43
σ_e	1.13	1.13	1.13	1.10
ρ $_{(rho)}$	0.62	0.61	0.60	0.63
θ $_{(minimum)}$	0.38	0.38	0.37	0.39
θ $_{(mediam)}$	0.78	0.78	0.77	0.78
θ $_{(maximum)}$	0.82	0.82	0.81	0.82
Number of Observations	238,320	238,320	238,320	2,374,609
Number of Groups	21,994	21,994	21,994	21,875
R^2 (within)	0.160	0.160	0.160	0.001
R^2 (between)	0.79	0.79	0.80	0.47
R^2 (overall)	0.72	0.72	0.73	0.38
Breuch-Pagan LM Test	4.E+05	4.E+05	4.E+05	4.E+05
Wald Chi-square	124,615	125,544	129,897	19,619

Note: *, ** and *** denote significant at the 90%, 95% and 99% level.
Coefficients for country dummies and intercept are not reported due to space constraint
Source: Statistics Canada Trade Analyzer (2008).

Table 3. Estimates of Random-effects GLS Regression

Variables	Estimated Coefficient	Standard Errors	Variables	Estimated Coefficient	Standard Errors
$Ln(D_{ij})$	-1.32 ***	0.02	$China_{ex}^{ESA}$	0.29	0.61
$Ln(Y_i)_{(t-1)}$	1.19 ***	0.03	$China_{im}^{ESA}$	1.60 ***	0.62
$Ln(Y_j)_{(t-1)}$	0.73 ***	0.03	$China_{ex}^{Afr}$	1.50 ***	0.52
$Ln(Y/pop)_{it}$	0.56 ***	0.03	$China_{im}^{Afr}$	1.97 ***	0.53
$Ln(Y/pop)_{jt}$	0.57 ***	0.03	$China_{ex}^{USC}$	1.33	1.12
$Ln(Area_i)$	0.30 ***	0.02	$China_{im}^{USC}$	2.90 ***	1.12
$Ln(Area_j)$	-0.03	0.03	$China_{ex}^{LA}$	0.82	0.55
$Smctry_{ij}$	0.69 ***	0.11	$China_{im}^{LA}$	1.34 **	0.56
$Landl_i$	0.61 ***	0.18	$China_{ex}^{EU}$	0.80	0.56
$Landl_j$	-0.21	0.17	$China_{im}^{EU}$	1.85 ***	0.56
$Islandl_i$	0.68 ***	0.22	$China_{ex}^{ME}$	1.46 **	0.62
$Islandl_j$	0.64 *	0.17	$China_{im}^{ME}$	2.48 ***	0.63
$Cont_{ij}$	0.90 ***	0.08	$China_{ex}^{OCN}$	0.85	0.72
$Lang_{ij}$	0.54 ***	0.04	$China_{im}^{OCN}$	1.62 **	0.73
$Colony_{ij}$	0.43 ***	0.13	$China_{ex}^{USSR}$	-0.18	0.58
$ComCol_{ij}$	0.69 ***	0.04	$China_{im}^{USSR}$	1.30 **	0.58
$col45_{ij}$	1.30 ***	0.17			

degrees of freedom (m)	31	Number of Observations:	238,320
σ_u	1.396	Number of Groups	21,994
σ_e	1.129	R^2 (within)	0.16
ρ (rho)	0.605	R^2 (between)	0.80
θ (minimum)	0.3712	R^2 (overal)	0.73
θ (median)	0.7726	Breuch-Pagan LM Test	400,000
θ (maximum)	0.8127	Wald Chi-square	130,041

Note:a. *, ** and *** denote significant at the 90%, 95% and 99% level.

b. Coefficients for country dummies and intercept are not reported.

Source: Statistics Canada Trade Analyzer (2008).

Table 4. Standard and Gravity Model Adjusted Export Trade Intensity Index of China and Japan with selected Regions and Countries

Export Intensity Index
(Gravity Model Adjusted Export Intensity Index)

Exporter	China						Japan					
	1990	1992	1994	1998	2002	2005	1990	1992	1994	1998	2002	2005
Importer												
East and Southeast Asia (ESA)	5.06	4.45	2.84	3.04	2.58	2.11	2.59	2.44	2.51	2.59	2.57	2.49
	(0.33)	(0.33)	(0.24)	(0.30)	(0.25)	(0.25)	(0.11)	(0.12)	(0.16)	(0.19)	(0.19)	(0.24)
INDIA	0.16	0.28	0.87	0.82	1.14	1.20	0.87	0.77	0.72	0.83	0.58	0.65
	(0.01)	(0.02)	(0.09)	(0.09)	(0.13)	(0.17)	(0.25)	(0.25)	(0.28)	(0.38)	(0.29)	(0.42)
INDONESIA	2.14	1.49	1.27	1.22	1.57	1.11	2.62	2.26	2.71	2.35	2.29	1.66
	(0.30)	(0.24)	(0.24)	(0.27)	(0.34)	(0.30)	(0.36)	(0.36)	(0.54)	(0.57)	(0.59)	(0.55)
JAPAN/China[1]	2.55	2.71	3.15	3.49	3.13	2.67	1.34	1.46	1.51	1.76	2.23	2.37
	(0.30)	(0.39)	(0.56)	(0.75)	(0.71)	(0.78)	(0.14)	(0.17)	(0.22)	(0.29)	(0.37)	(0.50)
MONGOLIA	16.26	24.58	10.24	3.62	3.74	3.42	1.57	1.66	1.80	1.31	0.66	0.99
	(0.18)	(0.31)	(0.17)	(0.08)	(0.10)	(0.13)	(0.19)	(0.23)	(0.34)	(0.35)	(0.23)	(0.52)
SOUTH KOREA	0.63	1.62	1.66	2.29	2.14	1.97	3.12	2.71	2.77	2.79	3.16	3.48
	(0.05)	(0.14)	(0.16)	(0.22)	(0.19)	(0.21)	(0.10)	(0.10)	(0.11)	(0.12)	(0.14)	(0.18)
VIETNAM	0.29	1.62	1.98	3.08	2.20	2.50	3.35	1.68	1.14	1.92	1.74	2.01
	(0.01)	(0.07)	(0.10)	(0.18)	(0.13)	(0.20)	(0.44)	(0.26)	(0.22)	(0.46)	(0.46)	(0.73)
Europe (EU)	0.23	0.23	0.33	0.41	0.43	0.53	0.45	0.46	0.39	0.46	0.39	0.38
	(1.31)	(1.38)	(2.10)	(2.56)	(2.67)	(3.47)	(2.71)	(3.00)	(2.84)	(3.59)	(3.21)	(3.36)
FRANCE	0.21	0.19	0.26	0.40	0.36	0.46	0.38	0.37	0.31	0.37	0.37	0.33
	(1.15)	(1.07)	(1.56)	(2.36)	(2.03)	(2.74)	(2.14)	(2.30)	(2.06)	(2.60)	(2.76)	(2.70)
GERMANY	0.35	0.33	0.49	0.56	0.52	0.68	0.65	0.64	0.53	0.62	0.51	0.49
	(2.14)	(2.10)	(3.22)	(3.76)	(3.54)	(4.89)	(4.15)	(4.43)	(4.02)	(5.18)	(4.57)	(4.86)
UK	0.16	0.19	0.33	0.39	0.46	0.65	0.58	0.60	0.58	0.65	0.52	0.50
	(0.44)	(0.53)	(0.99)	(1.20)	(1.42)	(2.17)	(1.58)	(1.82)	(1.93)	(2.41)	(2.08)	(2.24)
USA & Canada (USC)	0.53	0.65	1.01	1.12	1.13	1.31	1.78	1.67	1.61	1.58	1.40	1.27
	(0.69)	(0.81)	(1.36)	(1.58)	(1.65)	(2.16)	(1.90)	(1.77)	(1.95)	(2.14)	(2.13)	(2.24)
CANADA	0.20	0.25	0.34	0.34	0.42	0.56	0.70	0.72	0.47	0.52	0.56	0.55
	(1.75)	(2.14)	(3.20)	(3.45)	(4.23)	(6.37)	(4.85)	(5.06)	(3.88)	(4.94)	(5.72)	(6.55)
USA	0.61	0.75	1.16	1.29	1.26	1.45	2.05	1.89	1.86	1.81	1.57	1.41
	(0.52)	(0.62)	(1.03)	(1.19)	(1.21)	(1.57)	(1.44)	(1.33)	(1.49)	(1.61)	(1.56)	(1.63)

Source: Authors' estimates based on data from Statistics Canada *Trade Analyzer* (2008).

Note: [1] The importer is Japan (China) when the exporter is China (Japan).

Appendix Table. Standard and Gravity Model Adjusted Export Trade Intensity Index for China and Japan Trade with other Regions and Countries

Export Intensity Index
(Gravity Model Adjusted Export Intensity Index)

Exporter	China						Japan					
Importer	1990	1992	1994	1998	2002	2005	1990	1992	1994	1998	2002	2005
Africa (AFR)	0.45	0.60	0.62	0.89	0.91	1.02	0.75	0.75	0.77	0.60	0.56	0.58
	(0.32)	(0.44)	(0.48)	(0.68)	(0.69)	(0.87)	(0.55)	(0.60)	(0.68)	(0.56)	(0.56)	(0.68)
CONGO	0.10	0.38	0.23	1.50	0.66	1.31	0.41	0.33	0.18	0.09	0.17	0.07
	(0.19)	(0.58)	(0.27)	(1.50)	(0.54)	(1.25)	(0.82)	(0.53)	(0.25)	(0.11)	(0.19)	(0.09)
EGYPT	0.44	0.68	0.56	0.61	0.91	0.68	0.42	0.42	0.44	0.45	0.40	0.36
	(0.17)	(0.27)	(0.24)	(0.26)	(0.40)	(0.33)	(0.19)	(0.20)	(0.24)	(0.26)	(0.25)	(0.26)
SOUTH AFRICA	0.02	0.12	0.61	1.04	1.13	1.14	1.32	1.22	1.14	0.80	0.70	0.87
	(0.01)	(0.04)	(0.21)	(0.38)	(0.40)	(0.47)	(0.40)	(0.39)	(0.42)	(0.34)	(0.31)	(0.46)
Latin America & Caribbean (LAC)	0.20	0.15	0.19	0.31	0.40	0.57	0.78	0.81	0.78	0.80	0.74	0.86
	(0.14)	(0.11)	(0.16)	(0.28)	(0.32)	(0.53)	(0.44)	(0.49)	(0.56)	(0.66)	(0.59)	(0.81)
BRAZIL	0.36	0.10	0.19	0.42	0.52	0.80	0.78	0.57	0.59	0.69	0.62	0.68
	(0.16)	(0.05)	(0.09)	(0.23)	(0.26)	(0.46)	(0.30)	(0.24)	(0.29)	(0.39)	(0.35)	(0.45)
CHILE	0.39	0.47	0.70	0.94	1.12	0.91	0.78	0.96	0.83	0.71	0.54	0.62
	(0.24)	(0.31)	(0.54)	(0.77)	(0.79)	(0.75)	(0.35)	(0.48)	(0.51)	(0.49)	(0.35)	(0.49)
COLOMBIA	0.01	0.10	0.16	0.22	0.50	0.66	0.93	0.75	0.68	0.81	0.80	0.57
	(0.01)	(0.06)	(0.11)	(0.16)	(0.35)	(0.53)	(0.46)	(0.39)	(0.41)	(0.55)	(0.56)	(0.47)
MEXICO	0.19	0.11	0.09	0.17	0.31	0.43	0.34	0.53	0.49	0.43	0.51	0.73
	(0.15)	(0.08)	(0.08)	(0.15)	(0.27)	(0.43)	(0.19)	(0.31)	(0.33)	(0.33)	(0.42)	(0.71)
Middle East (ME)	0.71	0.69	0.78	0.74	0.92	0.93	1.20	1.22	0.87	0.99	0.91	0.80
	(0.25)	(0.25)	(0.30)	(0.30)	(0.36)	(0.42)	(0.51)	(0.55)	(0.44)	(0.56)	(0.54)	(0.56)
JORDAN	0.62	0.87	0.89	0.64	1.23	1.35	0.35	0.66	0.40	0.72	0.45	0.49
	(0.38)	(0.58)	(0.66)	(0.51)	(0.97)	(1.19)	(0.25)	(0.53)	(0.38)	(0.78)	(0.52)	(0.66)
SAUDI ARABIA	0.77	0.57	0.59	0.64	0.77	0.88	1.57	1.52	1.04	1.04	1.48	1.38
	(0.18)	(0.14)	(0.15)	(0.17)	(0.21)	(0.28)	(0.43)	(0.45)	(0.35)	(0.40)	(0.61)	(0.69)
TURKEY	0.33	0.16	0.33	0.46	0.46	0.69	0.59	0.51	0.35	0.57	0.36	0.39
	(0.19)	(0.09)	(0.19)	(0.27)	(0.26)	(0.45)	(0.38)	(0.35)	(0.26)	(0.44)	(0.30)	(0.37)
Oceania (OCN)	0.76	0.81	0.97	1.10	1.33	1.37	1.89	1.72	1.76	1.74	1.73	1.79
	(0.13)	(0.15)	(0.20)	(0.24)	(0.29)	(0.35)	(0.23)	(0.23)	(0.28)	(0.31)	(0.33)	(0.42)
AUSTRALIA	0.89	0.92	1.11	1.21	1.43	1.49	2.01	1.86	1.89	1.84	1.76	1.82
	(0.15)	(0.16)	(0.22)	(0.26)	(0.29)	(0.37)	(0.23)	(0.24)	(0.28)	(0.32)	(0.32)	(0.41)
NEW ZEALAND	0.38	0.55	0.61	0.84	1.01	1.00	1.62	1.45	1.51	1.48	1.76	1.83
	(0.08)	(0.12)	(0.15)	(0.22)	(0.26)	(0.30)	(0.23)	(0.23)	(0.28)	(0.31)	(0.39)	(0.50)
PAPUA NEW GUINEA	0.40	0.45	0.39	0.38	0.29	0.49	1.13	1.30	1.33	1.42	0.72	0.73
	(0.09)	(0.10)	(0.10)	(0.10)	(0.08)	(0.16)	(0.15)	(0.19)	(0.23)	(0.28)	(0.15)	(0.19)
Former Soviet Republics (FSR)	-	-	1.02	0.31	0.50	0.58	-	-	0.24	0.16	0.16	0.36
	-	-	0.39	(0.12)	(0.19)	(0.26)	-	-	0.23	(0.16)	(0.17)	(0.47)
RUSSIA	-	-	1.64	0.53	0.74	0.78	-	-	0.37	0.22	0.24	0.71
	-	-	0.44	(0.12)	(0.18)	(0.23)	-	-	0.30	(0.16)	(0.20)	(0.74)

Source: Authors' estimates based on data from Statistics Canada *Trade Analyzer* (2008).

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Appendix: List of Regions and Countries included in the Dataset used in estimates

AFR—Saharan and Sub-Saharan Africa: Algeria, Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo, Congo Dem Rep, Cote D'Ivoire, Djibouti, Egypt, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Niger, Nigeria, Rwanda, Senegal, Seychelles, Somalia, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe.

ESA—East and South/Southeast Asia: Bangladesh, Brunei Darussalam, Cambodia, Hong Kong, India, Indonesia, Japan, Korea Republic, Laos People's Democratic Republic, Macao, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam.

EU—Europe: Albania, Austria, Belgium-Luxembourg, Bosnia and Herzegovina, Bulgaria, Croatia, Denmark, Finland, France, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Italy, Macedonia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia-Mont., Slovenia, Spain, Sweden, Switzerland, United Kingdom.

FSR—Former Soviet Republics: Azerbaijan, Armenia, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

LAC—Latin America and the Caribbean: Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Cayman Islands, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Greenland, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St Pierre Miquelon, Suriname, Trinidad Tobago, Uruguay, Venezuela.

ME—Middle East: Cyprus, Iraq, Israel, Jordan, Bahrain, Kuwait, Lebanon, Oman, Iran, Saudi Arabia, United, Arab Emirates, Syrian Arab Republic.

OCN--Oceania: Australia, Fiji, Kiribati, New Caledonia, New Zealand, Papua New Guinea, Solomon Islands.

USC—United States and Canada: USA, Canada